

Evaluation of Stroke Severity among Patients Admitted to the Neurological Ward at Shar Teaching Hospital, Sulaymaniyah City



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ABSTRACT

Background: Stroke is an acute neurological disorder that causes cell death by reducing or interrupting blood flow to the brain, and it is the second leading cause of death worldwide. The aim of this study was to evaluate stroke severity among patients. **Methods:** A cross-sectional study was conducted in the neurological ward of Shar Teaching Hospital in Sulaymaniyah City, involving 90 patients with acute stroke. The National Institutes of Health Stroke Scale (NIHSS) was used to evaluate stroke severity. The Statistical Package for the Social Sciences, version 22, was used to analyze the data. **Results:** About three-quarters (71.1%) of patients were between 50 and 74 years of age, mean age of the patients was 68.2 ± 8.8 years, and there was a slight male predominance (54.4%). The majority had hypertension (73.3%), followed by cardiac disease (42.2%), diabetes mellitus (28.9%), smoking (23.3%), and obesity (10%). Based on NIHSS scores, it was found that more than half (53.3%) were classified as having a moderate grade, followed by moderate-severe (23.3%), mild (13.3%), and severe (10%). **Conclusion:** The study concluded that more than half of patients had moderate severity levels of stroke. The severity level was significantly associated with age, gender, place of residence, hypertension, cardiac diseases and smoking. There was no significant association with education, occupation, diabetes mellitus and body mass index.

Index Terms: Stroke Severity, Patients, Neurological Ward, National Institutes of Health Stroke Scale

1. INTRODUCTION

Stroke, also known as a cerebrovascular accident, is a medical emergency caused by an abrupt interruption or reduction of blood flow to the brain. Stroke is divided into two main types based on its cause: Ischemic stroke and hemorrhagic stroke [1]. Ischemic stroke is caused by the formation of a blood clot or atherosclerotic plaque, resulting in reduced cerebral blood flow to the brain,

whereas hemorrhagic stroke is caused by the rupture of a blood vessel and bleeding [2].

Stroke is the second leading cause of death worldwide and the main cause of long-term morbidity [3]. According to statistical reports, more than 13.7 million people worldwide suffer from strokes every year; the incidence of stroke is expected to increase further by 3.4 million until the year 2030 [4]. Early recognition, timely acute management, and rehabilitation are critical to reducing mortality and improving functional outcomes in patients with this condition [5].

Various modifiable and non-modifiable risk factors have been identified for stroke. Non-modifiable risk factors are age, gender, ethnic background, heredity, and race. Modifiable risk factors include hypertension, dyslipidemia,

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diabetes, heart disease, smoking, drug abuse, and alcohol consumption [6]. Patients with atrial fibrillation, chronic hypertension, and diabetes mellitus have produced more severe stroke symptoms. In addition, active smoking, dyslipidemia, coronary artery disease, and heart failure have all been associated with worse outcomes. Prior transient ischemic attacks have also been linked to cerebrovascular events, which may influence clinical severity at onset [7].

Common symptoms of stroke include sudden weakness in limbs, face drooping, paralysis, and slurred speech. However, some patients may present with less typical stroke symptoms, such as dizziness, vision problems, or cognitive impairment [8]. These neurological deficits can be evaluated using a scoring system called the National Institutes of Health Stroke Scale (NIHSS) [1]. The NIHSS is a 15-item impairment scale used to measure stroke severity. It was originally developed in 1989 by stroke neurologists from the University of Cincinnati, the University of Iowa, and the National Institutes of Health-National Institute of Neurological Disorders and Stroke [9], [10]. It includes the following domains: Level of consciousness, eye movements, integrity of visual fields, facial movements, arm and leg muscle strength, sensation, coordination, language, speech, and neglect. The original 15-item NIHSS remains the most widely accessible, although several versions have been developed (such as the 5-, 8-, and 11-item modified NIHSS) [11]. The NIHSS is a standardized, valid, reliable, and widely used systematic instrument for assessing acute stroke-related neurological impairments. Facilitates clinical decision-making, prognostic evaluation, treatment planning, and secondary stroke prevention [12]. Therefore, the aim of the study was to evaluate the severity of stroke among patients admitted to the neurological ward at Shar Teaching Hospital, Sulaymaniyah City, and to identify the relationship between stroke severity and sociodemographic characteristics

2. MATERIALS AND METHODS

2.1. Design

A cross-sectional study was conducted from January 3 to May 21, 2026, to evaluate stroke severity among patients admitted to the neurological ward at Shar Teaching Hospital, Sulaymaniyah City.

2.2. Study Sample

A non-probability purposive sampling technique was used to select 90 patients admitted to the neurological ward at Shar Teaching Hospital, Sulaymaniyah City.

2.3. Inclusion and Exclusion Criteria

Inclusion criteria included stroke patients of both sexes aged 18 years or older who had a clear diagnosis of stroke, confirmed by computed tomography (CT) scan or magnetic resonance imaging. Patients with previous neurological disorders, such as Alzheimer's disease or Parkinson's disease, as well as patients who were clinically unstable and required close monitoring were excluded from the present study to ensure accurate and reliable data collection.

2.4. Data Collection and Study Instruments

The data were collected by face-to-face interviews through a questionnaire that was developed by the researcher that consisted of three sections. The first section included sociodemographic characteristics of the patients, such as age, gender, level of education, marital status, employment, financial status, and residential area. The second section also included clinical characteristics, such as stroke type, history of hypertension, cardiac diseases, diabetes mellitus, smoking, body mass index (BMI), and length of hospital stay. The third section assessed stroke severity using the NIHSS. The NIHSS consists of 11 items, each of which assesses a different neurological function ranging from 0 to 4. For each item, a score of 0 indicates normal function in that specific ability, whereas a higher number may indicate a greater neurological impairment. The overall NIHSS score is determined by adding the individual values from each item. A score of 0 is the lowest possible and 42 is the highest [13]. Verbal consent was obtained from the participants or relatives before data collection, and they were informed that they had the right to withdraw from the study when they liked. Six patients withdrew from the study because they underwent medical treatment or diagnostic procedures, such as computed tomography or magnetic resonance imaging, or they were fatigued. Each interview lasted about 15–20 min.

2.5. Scoring and Interpretation

The NIHSS score was interpreted as follows: No stroke symptoms (0), mild (1–4), moderate (5–15), moderate-to-severe (16–20) and severe (21–42) [14]. The BMI was classified as follows: Underweight (<18.5), normal weight (18.5–24.9), overweight (25–29.9), and obese (≥ 30) [15].

2.6. Validity and Reliability

To verify the content validity, the study instrument was reviewed by five medical experts from different specialties, including adult nursing, community health nursing, and neurology. To ensure that the instrument was clear, appropriate, and aligned with research objectives. Minor modifications were made based on expert feedback.

Consequently, the questionnaire was appropriately valid after their valuable suggestions. Cronbach's alpha was used to measure the reliability of the study instrument. The Cronbach's alpha coefficient was 0.83, which indicates high internal consistency. A pilot study was conducted with 10 patients who met the study inclusion criteria. Thus the questionnaire had an adequate level of consistency and equivalence measurability. Data from the pilot study were not included in the final analysis.

2.7. Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences, version 22. Descriptive statistics, such as frequency, percentage, mean, and standard deviation, were used to describe the sociodemographic and clinical characteristics of the sample. A Chi-square test was used to determine the association between stroke severity and sociodemographic and clinical variables. A $P = 0.05$ was used as the cutoff for statistical significance.

2.8. Limitation of the Study

1. The main limitation of the study was a single-center study, which might not reflect the actual epidemiological and clinical pictures.
2. This is a cross-sectional study at one point of time, which could decrease the generalization of the study findings.
3. Possible communication barriers exist during interviews with stroke patients.

3. RESULTS

Most patients were aged 50–74 years (71.1%), with a mean age of 68.2 ± 8.8 , male (54.4%), illiterate or had only a primary school education (56.7%), married (82.2%), unemployed (66.7%), barely sufficient (60%) and from urban areas (63.3%) (Table 1). Furthermore, the majority had hypertension (73.3%), followed by cardiac diseases (42.2%), diabetes mellitus (28.9%), smoking (23.3%), obesity (10%), and the majority of patients (86.7%) stayed for ≤ 1 week (5.2 ± 2.0 days) (Table 2). However, the majority of patients had an ischemic stroke (86.7%) (Fig. 1). After leveling with NIHSS it was found that more than half (53.3%) had moderate stroke severity, (23.3%) had moderate-severe, (13.3%) had mild, and only 10% had severe (Fig. 2). A significant association was found between stroke severity levels and each age ($P = 0.016$), gender ($P = 0.002$), residence ($P = 0.036$), hypertension ($P = 0.000$), cardiac disease ($P = 0.018$), smoking ($P = 0.000$) No significant association was found between stroke severity levels with education ($P = 0.398$), occupation ($P =$

TABLE 1: Sociodemographic characteristics of stroke patients admitted to the neurological ward at Shar Teaching Hospital (n=90)

Variables	No.	%
Age groups		
18–49	8	8.9
50–74	64	71.1
≥ 75	18	20
Mean $\pm$ Standard deviation		68.2 $\pm$ 8.8
Gender		
Male	49	54.4
Female	41	45.6
Level of education		
Illiterate or primary education	51	56.7
Secondary school	15	16.7
University or Institute	24	26.6
Marital status		
Single	2	2.2
Married	74	82.2
Widow/widower	14	15.6
Occupation		
Employed	30	33.3
Unemployed	60	66.7
Financial status		
Sufficient	24	26.7
Barely sufficient	54	60
Insufficient	12	13.3
Residency		
Urban	57	63.3
Suburban	24	26.7
Rural	9	10
Total	90	100

TABLE 2: Clinical characteristics of stroke patients admitted to the neurological ward at Shar Teaching Hospital (n=90)

Variables	No.	%
Hypertension		
Yes	66	73.3
No	24	26.7
Cardiac disease		
Yes	38	42.2
No	52	57.8
Diabetes mellitus		
Yes	26	28.9
No	64	71.1
Smoking		
Yes	21	23.3
No	69	76.7
Body mass index		
Normal weight	60	66.7
Overweight	21	23.3
Obese	9	10
Length of hospital stay		
≤ 7 days	78	86.7
> 7 days	12	13.3
Mean $\pm$ Standard deviation		5.2 $\pm$ 2.0
Total	90	100

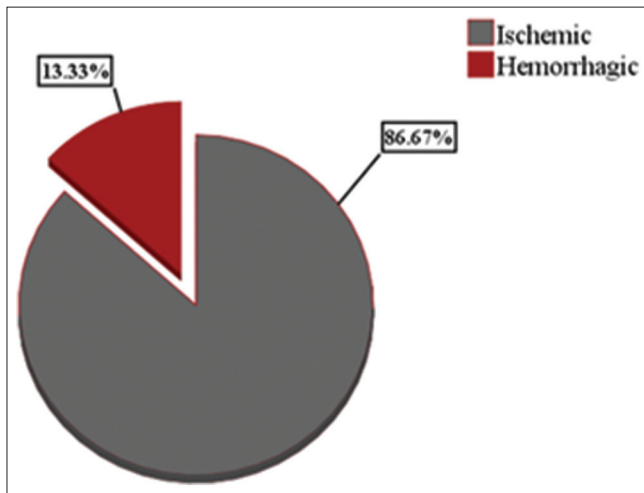


Fig. 1. Types of stroke.

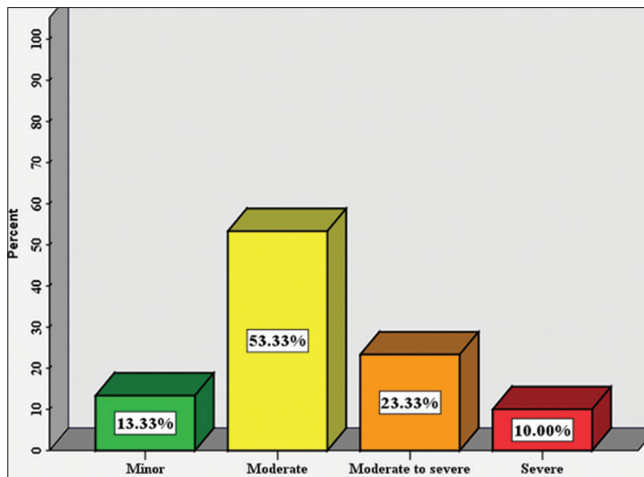


Fig. 2. Stroke severity levels according to the National Institutes of Health Stroke Scale.

0.059) and diabetes mellitus ($P = 0.501$) and BMI ($P = 0.051$) (Tables 3 and Table 4).

4. DISCUSSION

The findings of the study performed by Hussein and Amen [16] had also been obtained in 131 patients with ischemic stroke at the neurological department of Shar Teaching Hospital in Sulaimaniyah City. They mostly agree with the present finding which found that most patients were elderly, males, uneducated, married, and lived in urban areas.

The predominance of old age and males among stroke patients may be explained by several biological and behavioral

factors. Aging is the strongest non-modifiable risk factor for incident stroke, which doubles every 10 years after age 55. Approximately three-quarters of all strokes occur in individuals aged ≥ 65 years [17]. This higher risk correlates with the higher incidence of high blood pressure (BP), diabetes mellitus, smoking, obesity, physical inactivity, and atrial fibrillation among older people [18], [19]. Furthermore, there was a significant association between age and stroke severity. Patients aged ≥ 75 years were expected to have more severe strokes, but in my study, they had moderate strokes. This might be due to the small number of patients in this age group, early hospital admission, or the limited sample size. The study conducted by Demir and Eren [20] which found that there was a significant association between the severity of stroke and increased age.

In the present study, there was a slight male predominance. However, there was a significant association between stroke severity and gender, with male patients having a higher percentage of severe stroke levels than female patients. The higher prevalence of stroke among males can be explained by hormonal and constitutional factors, as well as the higher rate of smoking and stressful situations among males than among females [21].

In the present study, approximately three-quarters of patients had hypertension, which is slightly higher than in the studies conducted by Soliman *et al.* [22] and Zhuo *et al.* [23], who found hypertension in 62.3% and 62% of patients, respectively. A systematic review and meta-analysis of about 1.8 million participants reported that hypertension nearly doubled stroke risk and that each 5 mmHg reduction in systolic BP lowered stroke risk by approximately 22% [24]. Moreover, the finding of Zhuo *et al.* [23] were mostly agree with present finding, which showed that the majority had experienced an ischemic stroke, and more than two-thirds of the study sample being non-smokers. Physical inactivity, excessive alcohol consumption, diabetes, and obesity are all significant population-level drivers of BP; high salt intake can aggravate high BP. An increase in BP can cause endothelial dysfunction, which can lead to atherosclerosis. Furthermore, hypertension affects tiny perforators that come from the intracranial artery. Elevated BP has the potential to rupture these tiny perforators, resulting in a hemorrhagic stroke, or to obstruct them, leading to an ischemic stroke [25].

More than one quarter of patients in the present study have diabetes; a systematic review and meta-analysis of 39

TABLE 3: Association between sociodemographic characteristics and stroke severity levels

Variables	n=90							
	Mild		Moderate		Moderate-to-severe		Severe	
	F (%)		F (%)		F (%)		F (%)	
Age groups								
18–49	0	(0)	5	(62.5)	0	(0)	3	(37.5)
50–74	12	(18.8)	31	(48.4)	15	(23.4)	6	(9.4)
≥75	0	(0)	12	(66.7)	6	(33.3)	0	(0)
$\chi^2=16.402$	P=0.016		Significant				df=6	
Gender								
Male	11	22.4	18	36.8	14	28.6	6	12.2
Female	1	2.4	30	73.2	7	17.1	3	7.3
$\chi^2=14.067$	P=0.002		Significant				df=3	
Levels of education								
Illiterate or Primary education	6	11.8	27	52.9	12	23.5	6	11.8
Secondary school	3	20	6	40	3	20	3	20
University or Institute	3	12.5	15	62.5	6	25	0	0
$\chi^2=5.646$	P=0.398		Not significant				df=6	
Occupation								
Employed	6	20	15	50	9	30	0	0
Unemployed	6	10	33	55	12	20	9	15
$\chi^2=6.951$	P=0.059		Not significant				df=3	
Residency								
Rural	0	0	6	66.7	0	0	3	33.3
Suburban	3	12.5	9	37.5	9	37.5	3	12.5
Urban	9	15.8	33	57.9	12	21.1	3	5.2
$\chi^2=13.741$	P=0.036		Significant				df=6	

 χ^2 : Chi square test

studies ($n = 359,783$) found that 28% of stroke patients have diabetes. Most studies found that acute hyperglycemia and diabetes were associated with poorer outcomes after ischemic or hemorrhagic strokes, including higher mortality, poorer neurological and functional outcomes, longer hospital stay, higher readmission rates, and stroke recurrence [26].

In the present study, patients with hypertension, cardiac disease, diabetes mellitus, and smoking were more likely to have a severe stroke than people who did not have those risk factors. There was a significant association between these risk factors and stroke severity, except for diabetes mellitus. These findings come with studies [23], [27], [28].

Regarding the length of hospital stay, it showed that the majority of patients stayed for ≤ 1 week. This could be due to the fact that patients who have a moderately severe stroke tend to have a longer length of hospital stay compared to those with low-severity strokes, which recover faster.

However, patients with severe strokes have high death rates within the first few days of admission and therefore tend to have shorter hospital stays compared to persons with moderately severe strokes [29].

In the present study, more than half had moderate stroke severity, nearly a quarter had moderate-severe, approximately one-eighth of the participants had mild, and only one-tenth had severe according to the NIHSS. These findings are consistent with other previous studies, which have found that moderate stroke is the most prevalent severity level in hospitalized patients. Ghose *et al.* [13] found that more than half of the patients (51%) were classified as moderate severity, followed by moderate-severe (22%), mild (16%), and severe (11%). Another cross-sectional study was conducted by Khan *et al.* 2022 in Pakistan, involving 400 patients ranging from 30 to 90 years of age, and the stroke severity was evaluated by the NIHSS, which found that 49% of cases were moderate [30].

TABLE 4: Association between clinical characteristics and stroke severity levels

Variables	n=90			
	Mild	Moderate	Moderate-To-severe	Severe
	F (%)	F (%)	F (%)	F (%)
Hypertension				
Yes	3 (4.5)	39 (59.2)	15 (22.7)	9 (13.6)
No	9 (37.5)	9 (37.5)	6 (25)	0 (0)
$\chi^2=19.185$	$P=0.000$		Significant	df=3
Cardiac disease				
Yes	8 (21.1)	13 (34.2)	12 (31.5)	5 (13.2)
No	4 (7.7)	35 (67.3)	9 (17.3)	4 (7.7)
$\chi^2=10.021$	$P=0.018$		Significant	df=3
Diabetes mellitus				
Yes	4 (15.4)	14 (53.8)	4 (15.4)	4 (15.4)
No	8 (12.5)	34 (53.1)	17 (26.6)	5 (7.8)
$\chi^2=2.167$	$P=0.501$		Not significant	df=3
Smoking				
Yes	9 (42.9)	3 (14.3)	6 (28.6)	3 (14.2)
No	3 (4.3)	45 (65.3)	15 (21.7)	6 (8.7)
$\chi^2=26.563$	$P=0.000$		Significant	df=3
Body mass index				
Normal weight	6 (10)	35 (58.3)	13 (21.7)	6 (10)
Overweight	6 (28.6)	9 (42.9)	6 (28.6)	0 (0)
Obese	0 (0)	4 (44.5)	2 (22.2)	3 (33.3)
$\chi^2=13.527$	$P=0.051$		Significant	df=6

 χ^2 : Chi square test

5. CONCLUSION

The study concluded that a higher number of stroke patients were middle adults to elderly, male, married, and had no formal schooling. The majority had hypertension, most patients had heart disease, two-thirds did not smoke, and a few of them were obese. After assessing with an NIHSS score, it was found that more than half of patients had moderate severity levels. The severity level was significantly associated with age, gender, residency, hypertension, cardiac diseases, and smoking, while there was no significant association with education and occupation. These findings highlight the importance of early identification and management of modifiable risk factors to reduce stroke severity and improve patient outcomes.

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7. ETHICAL CONSIDERATIONS

The Scientific and Ethical Committees of the College of Nursing/University of Sulaimani have granted their ethical approval for this study.

8. CONFLICTS OF INTEREST

None.

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